

## 9.2 Application Problems using Vectors

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

**Solve. Draw a diagram and show all your work. Round all answers to the nearest tenth if necessary.**

1. Two forces of 4.2 N and 10.3 N (newtons) act on an object. The angle between the forces is  $100^\circ$ . Find the magnitude of the resultant force and the angle between the resultant and each force.
2. One rope pulls a barge directly east with a force of 45 N, and another rope pulls the barge directly north with a force of 68 N. Find the magnitude of the resultant force acting on the barge.
3. A force of 689 lb is required to pull a boat up a ramp inclined at  $16^\circ$  with the horizontal. How much does the boat weigh?
4. The resultant of a 10-lb force and another force has a magnitude of 12.3 lb at an angle of  $23.4^\circ$  with the 10-lb force. Find the magnitude of the other force and the angle between the two forces.

5. Ronnie, Phyllis, and Ted are conducting a vector experiment in a Wal-Mart parking lot. Ronnie is pushing a cart containing Phyllis to the east at 5 mph while Ted is pushing it north at 3 mph. What is Phyllis's speed and in what direction (measured from north) is she moving?

6. In Roman mythology, Sisyphus, King of Corinth, revealed a secret of Zeus and thus incurred the god's wrath. As punishment, Zeus banished him to Hades where he was doomed for eternity to roll a rock uphill, only to have it roll back on him. If Sisyphus stands in front of a 4000-lb spherical rock on a 20 degree incline, what force applied in the direction of incline would keep the rock from rolling down the incline?

7. If Superman exerts 1000 pounds of force to prevent a 5000-lb boulder from rolling down a hill and crushing a bus full of children, then what is the angle of inclination of the hill?

8. A plane is headed due east with an air speed of 240 mph. The wind is from the north at 30 mph. Find the bearing for the course and the ground speed of the plane.

9. An airplane is heading on a bearing of  $102^\circ$  with an air speed of 480 mph. If the wind is out of the northeast (bearing  $225^\circ$ ) at 58 mph, then what are the bearing of the course and the ground speed of the airplane?

10. The heading of a helicopter has a bearing of  $240^\circ$ . If the 70-mph wind has a bearing of  $185^\circ$  and the air speed of the helicopter is 195 mph, then what are the bearing of the course and the ground speed of the helicopter?

**Without graphing, state the degree of the polynomial, then write the end behavior as a limit.**

11.  $f(x) = x^5 + 3x^4 - 2x^3 - 5x^2 - 10x + 1$

degree:

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow \infty} f(x) =$$

**Factor completely.**

12.  $x^3 + 8$

13.  $27x^3 - 125$

**Divide using long division.**

14.  $\frac{3x^2 + 11x - 70}{x + 7}$

**Divide using synthetic division.**

15.  $(x^3 - 8x^2 + 10x - 21) \div (x - 7)$

**Find the zeros.**

16.  $x^2 + 2x - 48 = 0$

**Find all of the real zeros of the function, finding exact values whenever possible. Identify each zero as rational or irrational. Hint:  $\frac{p}{q}$**

17.  $f(x) = 2x^3 - 3x^2 - 4x + 6$

18.  $f(x) = x^3 + x^2 - 8x - 6$